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Introduction of New Techniques and Changes in Work Organization at the Port of Las Palmas: An Historical Review

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DOCUMENTO DE TRABAJO 2002-01

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INTRODUCTION OF NEW TECHNIQUES AND CHANGES IN WORK ORGANIZATION AT THE PORT OF LAS PALMAS: AN HISTORICAL REVIEW

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Septiembre de 2001

Resumen

En el Puerto de Las Palmas, la introducción de tecnología en la manipulación de la carga condujo a una considerable reducción de la mano de obra. La innovación tecnológica tuvo también un impacto importante sobre la organización del trabajo y las relaciones laborales. La implantación de la containerización a gran escala, desde el año 1960, trajo consigo la necesidad de nuevos métodos de organizar las labores portuarias, implicando también reducciones en los equipos de estiba y desestiba y cambios en las relaciones contractuales. Estos factores conformaron las bases de las mejoras en el rendimiento alcanzadas en años recientes.

Palabras claves: innovaciones tecnológicas, reforma portuaria, métodos de trabajo, Puerto de Las Palmas, transporte por container.

Clasificación JEL: N940, O33, J59

Abstract

In Las Palmas Port, the introduction of technology in the cargo handling process and the restructuring of transportation systems led to a considerable reduction in the port workforce. The technological innovations also had an important impact on the organization of work and labour relations. The large-scale introduction of containers from the 1960's onwards required new methods for organising port operations, leading to massive reductions in work team employment and changes in contractual relationships, factors which form the basis of the high performance achieved in recent years.

Key words: technological innovations, port reform, work methods, Las Palmas port, container transportation

JEL Classification: N940, O33, J59

[2] We would like to thank two anonymous referees for useful suggestions.

1. INTRODUCTION

The 1980's are of special significance in the history of Spanish ports owing to the fact that it was during this period that what has since come to be known as the "port reform" took place. While the profound impact which this was to have on the operating methods of Spanish ports is of undeniable importance, there have been surprisingly few studies into the phenomenon. When it comes to evaluating the importance of the reform there exists a general consensus that it was necessary as the transformations which were taking place in goods handling at the time demanded that changes took place. Another very different question is determining whether such reform was carried out within the most desirable parameters : again, there seems to be agreement that the policy of promoting greater understanding between the different port agents has been successful.

The technological transformations dating from the 1960's undoubtedly provided the base for this reform: containerization, the increasing size and speed of cargo vessels, the increasing use of roll-on/roll-off traffic and pallets for goods transportation and so forth. All such transformations were of great relevance to the loading and unloading procedures used in ports. In this study we are starting off from the hypothesis that the introduction of new technologies played a primordial role in the reform, requiring as they did profound changes to be made in the organization of labour, in the behaviour of port agents and their organizations, both at the company and worker level. In this way, increases in amounts of goods and handling methods, basically due to the development of container transportation and the increased size of merchant ships, has been accompanied by a fall in the number of port employees as a direct result of such modifications. This has in turn led to a profound change in company structure and an effective "oligopoly" in cargo handling operations, while in the consignment subsector the company structure has continued to be of an "atomized" nature, since this activity does not require major investments.

In order to adapt to the new circumstances a new legislative tool for governing the port system was created. This came to be known as the "Spanish ports model" (Trujillo y Nombela, 1998: 4). The underlying principle of the model is the regulation of ports by means of a public agency (Puertos del Estado) managed by the port authorities who determine prices within certain limits and who decide on the extent of private enterprise involvement in state-controlled services subject to an operating licence award regime. This legislative reform attempted to adapt Spanish ports to the requirements of the new situation facing them and to make them more competitive, so that charges for port services were adapted to real production costs. Needless to say, this had

an effect on the parameters upon which the traditional company structure and organization of labour were based.

As part of the Spanish ports system Las Palmas Port was also involved in the reform. Furthermore, the agents operating in the port were protagonists, for various reasons, of the events which unfolded during this period. The transformations which took place in goods transportation have accelerated from their origins in 1940 up to the present day, and Las Palmas Port was no exception to this tendency, the most significant development stage of which was initiated in the 1960's in terms of cargo handling methods and means. The nature of cargo handling has changed from a relatively low-tech, labour-intensive activity, to a capital –intensive, high-tech activity, which has inevitably led to a drastic reduction in manpower.

On the other hand, the introduction in the 1970's of a democratic labour relations framework to replace the Syndicalist Organization of the Franco Regime, required that labour organization strategies be adapted to those in force in other ports around the world. This was a highly complex process and was dogged by a powerful labour relations conflict as port workers attempted to combat the "port reconverion" at a time in which the economic recession was effecting all sectors of the Canary Islands economy. A further complicating factor was the decolonization of Spanish Sahara.

We are going to adopt a historical approach to analyse this process, since such a perspective should provide us with a greater understanding of labour relations interaction in the sector. This is a logical assumption, since specific types of unions have been created in Spanish ports over the course of time, as have company organizations and legal regulations specific to the sector. While the changes which have taken place have been profound, we cannot afford to ignore the important role played by tradition in the interaction of such factors.

The aim of this article is therefore to evaluate the incidence of technological changes in the organization of labour and in labour relations in Las Palmas Port in the 1970's, 80's and 90's, taking into account the fact that Las Palmas is one of Spain's principal ports and is a strategic element in the economy of the Canary Islands. After a brief introduction we will analyse the process of change and the introduction of new technologies in Las Palmas Port, as well as the relationship between the latter and the basic indicators of port traffic and employment. Thirdly, we will look at the legislative reforms which have been carried out over this period, with special ref-

erence to the role of social agents and the social conflict generated by the process. Finally, we will round off this paper with some general conclusions.

2. TECHNOLOGICAL CHANGES, TRANSFORMATIONS IN CARGO HANDLING AND EMPLOYMENT STRUCTURE

2.1. Technological innovations in the port operation system and their effect on the labour market.

One of the most significant features of port employment is its irregular nature, which is a direct consequence of the non-continuous nature of maritime commerce. It is common knowledge that as well as being determined by the evolution of economic cycles, maritime commerce can also be adversely effected by periods of bad weather, strikes or industrial disputes in ports of origin, changes in customs duty policies and numerous other uncontrollable variables. In this way, periods of inactivity traditionally alternate with the great demand for manpower generated by the arrival of ships in port.

Such a situation meant that port workers were paid on an irregular basis, linked to the existence of a heterogeneous and "atomized" company structure, since very few companies were in a position to be able to guarantee a minimum regular amount of work to maintain a considerable number of workers in permanent employment. However, this alone does not account for the temporary nature of port worker contracting, a phenomenon which is closely related to factors such as, for example, the characteristics of maritime trade. In practise, the opposing interests of port employers and employees paradoxically coincided in this area and helped to perpetuate this contracting system for a long period of time, since employers were interested in the availability of an oversized labour market composed of workers with no stable commitment to their companies. This oversized labour market was of great value to employees in that it guaranteed a swift execution of ship loading and unloading work as and when required, while it also provided them with an efficient mechanism for controlling their workforces. Furthermore, with temporary contracting, employers were not required to renumerate workers during periods of inactivity. Historically, this system took the form of a workers' pool which monopolized the manpower offer and was a very common feature of ports all over the world. Such a system also fitted in with the rules and values of the work culture existent in the docks. This "temporary work" mentality has long been regarded as one of the most common and persistent priciples held by dockers (Miller, 1969). In the United Kingdom, for

example, it has been demonstrated that one of the major obstacles to ending temporary contracting came basically from the dockers themselves (Philips and Whiteside, 1985).

In more recent times, one of the external factors with the greatest influence on changes which were to subsequently take place in ports has been the containerization of cargo, the handling of which has become highly mechanized. The changes which have taken place in most of the world's ports have been of a structural nature and have led to drastic reductions in port workforces. Very few ports in the world have not witnessed a workforce reduction from the year 1970 onwards. In the port of Las Palmas, the average annual work force, some 2000 at the beginning of the 1970's, stood at just 390 in 1999. While the port of Rotterdam boasted 12,443 registered dockers in 1972, this figure stood at 9,598 in 1981. Singapore went from 3,140 to 1,070 workers between 1972 and 1980 and the work force in the port of Liverpool fell from 11,065 in 1970 to just 2,333 in 1982. This dynamic meant that, owing to organizational limitations, while the number of containers being handled grew, so did the problems facing traditional ports, with dockers threatening to adopt measures of a defensive nature, such as insisting that the new container work continued to be carried out by teams with the same number of workers as for traditional loose cargo handling.

With respect to the ships, the most significant technological changes which have taken place were firstly the use of containers, followed by pallets, the appearance of roll-on/roll-off ships and the increase in the size of the vessels themselves, with the majority of cargo ships using larger and more versatile cranes. Meanwhile the docks experienced the introduction of fork-lift trucks, mobile cranes, trailers and tractors, together with new equipment and methods. All of these innovations were adopted fairly rapidly from the 1960's onwards, starting with the use of pallets in order to make the work of the fork-lift trucks easier. The first container ships and ro-ro vessels also appeared at this time.

The technological changes mentioned above had important consequences, in terms of both the quantity and quality of the workforce employed in the port and led not only to a reduction in physical effort but also to a reduction in the number of workers required in cago handling. This means that, in terms of the human skills required in ports, the traditional techniques of "good stevadoring" for general cargo holds or in the management of problematic cargos have become obsolete, as has much of the hard, repetitive work associated with loose cargo. The skills required

today are very different and port workers, who used to be regarded as non-skilled or semi-skilled operators, can now be clearly divided into the non-skilled and the highly skilled.

As well as the repetitive tasks of container work (coulping and uncoupling, fastening and unfastening etc.), which can be learned relatively easily, there are others, such as operating gantry cranes, fork-lift trucks, tugmaster tractors and other pieces of equipment which require a certain degree of skill, judgement and initiative. Much depends on safety and speed in highly expensive operations as well as on a complex chain of direct transportation. Similarly, the numbers of employees involved in checking and security duties has diminished, since these tasks are now carried out by computer, with the help of electronic devices, and are directed from control centres.

To summarize, therefore, the introduction of new technologies has led to profound transformations in the organization of port working practises and has had a number of different impacts on the structure of the labour force and company management.

2.2. The impact of technological change on the Port of Las Palmas

2.2.1 Evolution of port activity and employment

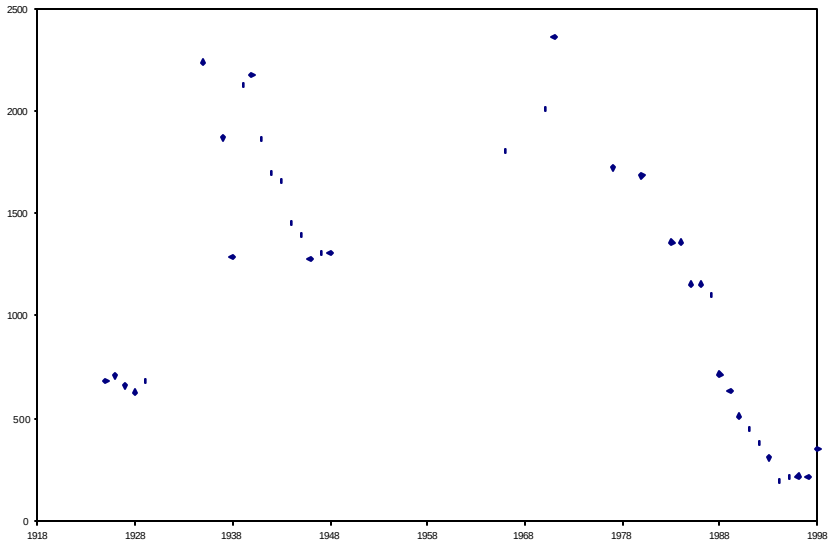
Las Palmas has traditionally been a port of call, transit and goods exchange, with its main function having been in the provision of services. Nowadays it plays an increasingly important role as an international container distribution platform, a “hub” port in sea trading jargon.

It is widely agreed that Puerto de La Luz owes its existence to a series of factors which enabled the bay of Las Palmas to become an obligatory point of reference in the mid-Atlantic for all trading routes between Europe and Latin America and South Africa. Its natural conditions have historically enabled the port to create appropriate infrastructures for providing for the needs of ships sailing down the eastern seaboard of the Atlantic, making it, thanks to its location, into a convenient port of call, and providing it with a near monopoly in certain areas, which, since the middle of the nineteenth century, have made navegation along these latitudes obligatory; namely, the provision of fuel, water and repair work. Since the 1970’s, the instability suffered by all of the world’s ports has been blamed on economic recessions, the introduction of the new technologies which we have just discussed, and also on competition from other forms of transportation, both by land and by air. Furthermore, the high cost of labour in port services led many employers to seek technological means to substitute the workers, whose powerful unions had succeeded in raising their real income to levels far in excess of those enjoyed by workers of other industrial

sectors. This in turn fostered the implantation of new technologies in the ports. The consequences of this process for Puerto de La Luz were dramatic: a workforce of 1,500-2,000 stevedores in the early 1970's was reduced to just 400-500 in the 1990's. It was the same story in Spain's other ports, where employment rates fell at an equally alarming rate, particularly amongst stevedores whose numbers decreased overall from the 12,500 registered by the Port Workers' Organization in 1980 to 3,974 in 1994 (Canalejos,1995:78).

The economic importance of port employment, and in particular employment related to the area of cargo handling should be seen not only in terms of its physical relevence as the effective link between the vessel and its destination, but also because of its impact on the total costs of overall port activity. Hi-tech developments in port operations and their effects on the costs of oversized workforce pools led to a reduction in the numbers of cargo handling operators. Graph 1 shows (although the data is discontinuous) the decreases in the annual average figures for total number of employees in all areas of port activity – from the moment in which goods are unloaded at port to the moment that they are loaded on board ship, or viceversa. While between 1925 and 1929 the average annual number of workers was 672, this figure increased between the years 1939 and 1948 to some 1,626 employees, reaching a peak of 2,360 in 1973. The number then falls to 1,390 in the period between 1980 and 1985 and reaches a low point of 391 average annual workers between 1988 and 1999. The data is totally unambiguous with respect to the employment curve, which goes into a headspin from the moment that the Spanish Port Reform measures were introduced in 1986.

Graph I: Average annual numbers of workers



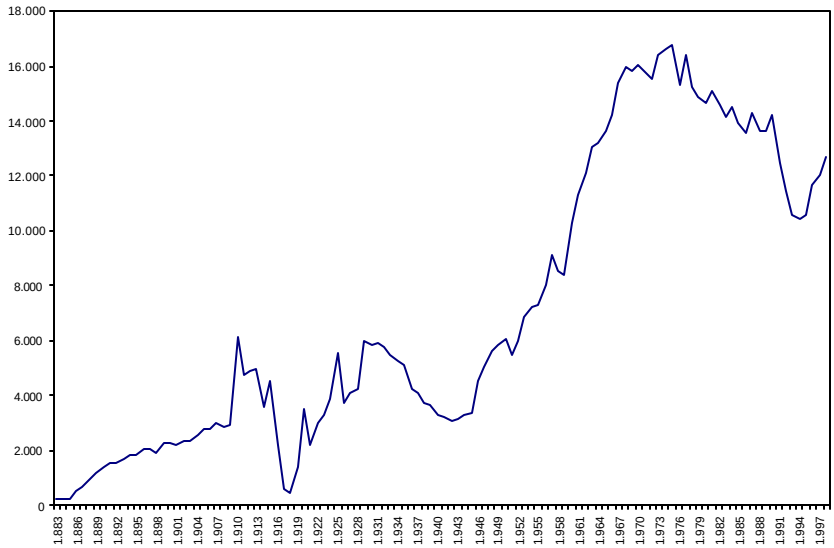
Source: Las Palmas Port Authority. SESTIBA

The development of the port followed the evolution of the demand for port services. Thus, the traffic in merchandise (liquids and solids in bulk, general goods, frozen fish) increased in almost all the periods from 1928 to 1988, with an average annual rate of increase of 7.6%, although there are considerable variations between different periods and/or years. The data reflecting volume of traffic shows us the extent of the transformation which has taken place, although it is not sufficient to pinpoint the evolution of cargo handling techniques used, due to the fact that the series published do not normally refer to these.

With respect to number of ships (both merchant ships and fishing vessels) using the installations of Las Palmas Port, the general trend until 1975 was upwards, although a number of significant falls can be observed (See Graph II). However, if we only take into account the number of ships visiting the port in the last 15 years we could reach some rather erroneous conclusions – i.e. if we make the false assumption that a reduction in the number of ships is equivalent to a reduction in cargo tonnage handled in the port. In fact while the number of ships calling in at the port did indeed fall, gross cargo tonnage actually increased. This is reflected in *the average ship size* variable, that is, the quotient between the gross tonnage registered and the number of merchant ships and fishing vessels registered in the Port records. The minimum value of this variable (See Annex , Table II) was reached in the year 1941, with a value of 468.3. By 1957 this

figure had risen to 4,230.7. There is then a constant, although irregular growth trend up to the year 1994, followed by a considerable increase between 1994 and 1998 The accumulated variation rate between these two years is 77.7.

Graph II:Number of ships served
Puerto de La Luz y de Las Palmas (1884-1998)



Source: Las Palmas Port Authority

We can obtain a better approximation by analysing the *average cargo per ship variable* (See Annex, Table III). This is defined as the quotient between the cargo tonnage handled in the port and the number of vessels registered. This variable demonstrates a continual growth rate up to the year 1959, followed by a fall up to the year 1975. From this year onwards, and up to the end point of the series, there was a continuous growth trend.

One last area is worth inspecting in our examination of the activities carried out at Puerto de La Luz. These activities have faced direct competition from a series of other ports in the geographical vecinity, which has slightly reduced the *hinterland* of the port. Nevertheless, because of the island nature of the port, such geographical competition has not been on the same scale as that faced by other Spanish and foreign ports and the results and indicators presented should thus be compared with other Spanish ports, since most of these are governed by the same regime as the Port of Gran Canaria.

2.2.2 Technological changes and the containerization process in Las Palmas Port

The technological changes experienced by port systems over the last few decades have been transcendental, both with respect to loose cargo, whose handling is far more labour intensive today, and to bulk cargo. The principal methods used for loading, unloading and stowage tasks have been modified with the passage of time, particularly in the last quarter of a century. We must appreciate the fact that the nature of the cargo effects the way in which it can be handled, in so far as cargo comes in many different forms: loose, in sacks, on pallets, in containers, and so on. The main handling methods used are as follows: cranes (gantry, motorized and others), electric trucks, fork-lift trucks, loading shovels, scoops, conveyor belts etc. The growth in commercial traffic has been characterized by the increasing use of containers, meaning that cranes, the essential impliment for handling containers, have taken on a new protaganism.

The process of mechanization in Las Palmas Port was initiated with the introduction of the famous *Titan* crane, which was installed in the port towards the end of the XIX century. The crane is still in use today, althogh it has been adapted to the requirements of modern port operations.The main technological advances commenced with the introduction of the wheelbarrow in the 1920's and 30's. These are still used today in some ports around the world, although in most cases they have long been superceded by the fork-lift truck. The latter, together with motorized crane, have played a fundamental role in the elimination of most of the physically arduous tasks carried out on land. Loose cargo handling can be both backbreaking and dangerous. However, from a quantative point of view, the mechanization process in the port has been rather irregular, and most of this process has taken place from 1958 onwards. The most significant changes (such as the use of cranes and electric trucks) took place at a relatively late stage. If we look just at the number of cranes in use at the port, the main variations occurred at the beginning of the 1970's, heralded by the new container cargo handling methods which we have already referred to (Graph III).

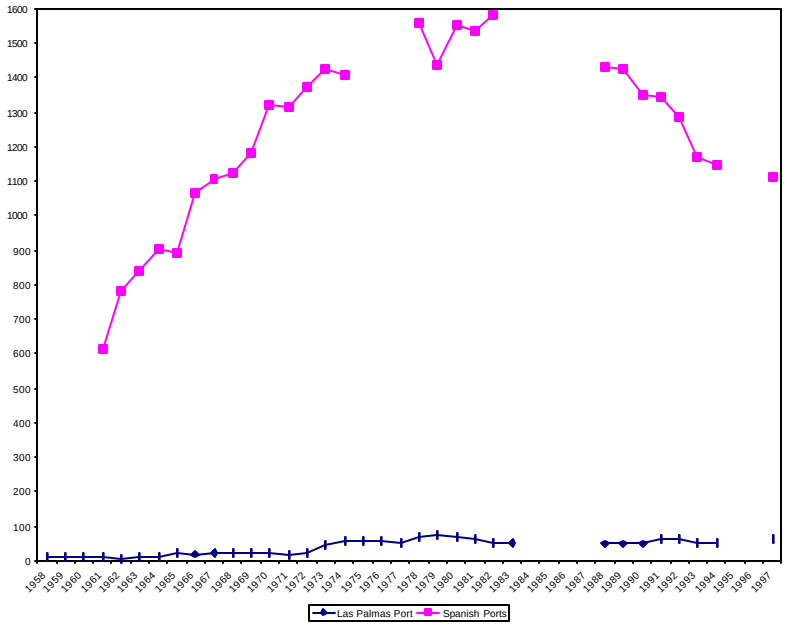
One major event which is worth drawing the reader's attention to was the creation of MABCSA in the 1950's. This company was formed by the port employers, and its purpose was to supply the latest mechanical cargo handling technology to its associate members. In hindsight, this proved to be an excellent strategic gamble, since as well as providing the port employers with the most up-to-date equipment, it also effectively erected a barrier to competion from outsiders. The initiative for the creation of this company came from Las Palmas Employers' Asso-

ciation of Shipping Agents, an organization made up of practically all the shipping agents and stevedore companies operating in the port at that time. This association acts as an authentic interest group, promoting actions of a corporate nature to the exclusive benefit of its associate members.

Technological innovation thus arrived in Las Palmas Port rather late in comparison with Spanish ports on the whole. Between 1961 and 1970 the total number of cranes variable displays an annual accumulated variation rate of 7.95 for the rest of Spain, in contrast to just 6.6 for Las Palmas Port, although the evolution trend for the number of cranes in existence was very similar between the years 1961 and 1974, with a high degree of positive correlation (0.69). This would indicate that the expansion of Las Palmas Port, measured in terms of number of cranes operating, was similar to that of other Spanish ports, although this expansion began at a rather later stage.

In subsequent periods where we have been able to obtain data (1978-1982 y 1988-1994), the correlation change in both sign and value, at –0.81 and –0.02 respectively. Both of these values demonstrate the disparity which exists between the trends, which can be observed in the following graph displaying the evolution of numbers of cranes both in Puerto de La Luz y de Las Palmas and in Spanish ports as a whole.

Graph III: Number of cranes



Source: Annual reports

Despite the discontinuity we can observe the divergence which exists between the two variables. Obviously the Spanish ports as a whole display a far larger number of cranes (for example, in 1994 there were 1,194 in Spain overall, and just 62 operating in Las Palmas. Nevertheless the biggest trend fluctuations occur at the national level with Las Palmas Port enjoying a far more stable trajectory.

Containerization has led to major changes in working methods and in the physical structure of Las Palmas Port, with traditional stevadore methods having been replaced by a capital intensive loading/unloading model. The containerization index (that is, the proportion of containerized cargo handled with respect to the overall amount of cargo handled) increased from 5.48% in 1973 to 57.04% in 1992 (from Rus et al. 1994: 45). In 1999 global container traffic reached 180,000 TEU's, growing from 300,000 TEU's in 1996 to 550,000 TEU's in 1999 (Pintado, 2000).

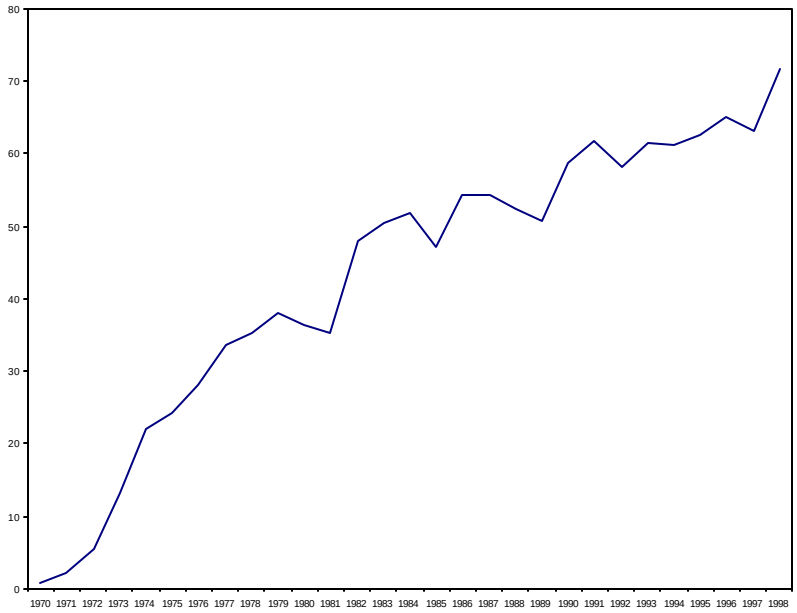
From the point of view of companies, container traffic has meant substantial investment in the acquisition of machinery. There are basically three companies operating with containerized cargo: OPSCA, La Luz Terminal de Contenedores, S.A. and Líneas Marítimas Canarias, with the first of these controlling approximately 35% of container cargo. Each of these holds a container terminal under licence, which has also involved major investment on the part of the Port Authority in terms of the provision of docks and cargo handling stages, with the physical space available at Puerto de La Luz currently a major bottleneck in the expansion of container traffic.

The possibility of concentrating containers of industrial and technological goods in international distribution platforms known as "hubs" is providing Las Palmas Port with a great opportunity to play a part in the great international transportation networks, since the port is located midway between Europe and South Africa, while at the same time it is at the crossroads between this trading route and the Mediterranean – South America route. As such it is a perfect Atlantic "hub".

The containerization index is one of the variables which we are highlighting in this paper, since it is one of the most relevent factors with respect to changes in cargo handling (Graph IV). This index, which is relatively short in historical terms, given that containers only started to be used in the Port from about 1970 onwards, is defined as the quotient between container and general cargo tonnage handled in the Port, and can thus be expressed as the percentage of goods transported by container. As a method of transportation containers offer more efficient handling

and reduced operating costs, particularly with respect to loading, unloading and stowage operations.

Graph IV: Containerization index
Puerto de La Luz y de Las Palmas (1970-1998)



Source: Las Palmas Port Authority. My own creation.

Comparatively speaking, Las Palmas Port occupies an outstanding position in the Spanish ports sysyem (Table I). Between the years 1963 and 1997 it accounted for some 9.7% of the total number of ships served in Spain as a whole, reaching a peak of 14% in the year 1990. With respect to total cargo traffic, this represented 7% in the first period, although this figure later fell to just 3%, the average over the period standing at 3.9%. Regarding the number of containers handled by the Port, we should emphasize that the starting point is the year 1971, and although Puerto de La Luz started out with low values, the variable grew to such an extent that the average for the overall period in question is about 8.5% of all containers handled in Spain.

Table I: Average of the simple indexes of port activity
Puerto de La Luz – Overall sum of National Ports
(Base year 1964, except containers 1972)

Period	Number of ships		Total tonnage		Number of containers		Tonnage carried by containers	
	National	L. Palmas	National	L. Palmas	National	L. Palmas	National	L. Palmas
1961-1970	118,6	121,3	113,4	86,7	-	-	-	-
1971-1980	135,1	122,0	211,7	80,1	131,5	150,8	250,9	378,2
1981-1990	113,1	128,5	279,0	142,2	354,1	408,7	863,3	1199,5
1991-1997	124,1	128,7	318,8	180,5	643,3	867,8	1723,3	2342,9

Source: Annual reports from MOPT and State Ports

2.2.3. Technological changes and the organization of working practises

With respect to the most qualitative aspects of port activity, Puerto de La Luz has, throughout its development, had a rather peculiar working organization, which, while being similar in nature to that of other ports, has survived until comparatively recently in the loading and unloading sector. The existence of a minimum number of workers designated to each of the tasks to which a work-team is assigned, is an important factor in maintaining a certain degree of control over the work carried out in the port. One relevent aspect worth evaluating is whether there existed *worker control* over the diverse tasks carried out (establishing shifts, the composition of the work teams, the foreman's functions, work speed) since this would represent an attempt on the part of workers to challenge the power of their employers. On occasion workers lost power through the force of circumstances; for example, in the reforms introduced in the 1980's they were forced to accept flexible time or night shifts. The regulating role played by tradition was applied in this case to ensure that the composition of work teams was maintained almost intact, in spite of the fact that technological innovations might well have enabled the teams to have been reduced. In this case it was the workers attempting to alter the balance of power, demanding increases in the numbers of workers required for particular tasks and per work team, and in several cases they succeeded. In 1978 the Local Port Committee of Puerto de La Luz approved an increase in the minimum number of workers per team from five to seven men for containers and from 3/5 to 13 men (!) for cabotage.

Another factor worth exploring if we wish to understand the port's labour relations, are the characteristics of port activities themselves, as each requires its own particular structure in the working day. In order to be able to satisfy the demands of intense traffic and ensure that a ship remains in port for the shortest possible time, the rotating shift carried out by work teams is the

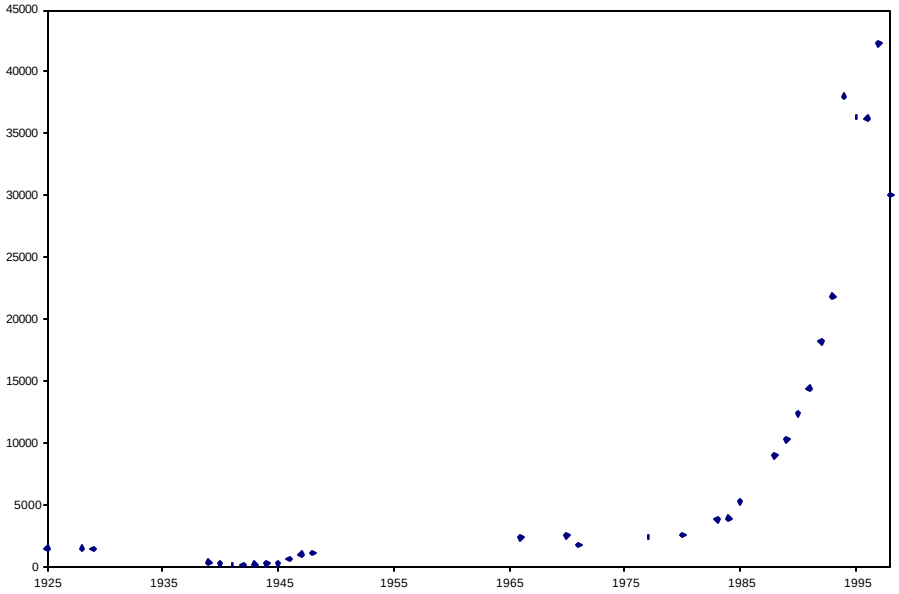
most efficient solution.In the 1940's the six hour intensive working day was introduced. This system was progressively adopted and it was a source of concern to employers as it was regarded as being inadequate for the speed of work required by a port. The workers, on the other hand, approved of the system. New cargo handling techniques brought with them new requirements: port work had to be carried out continuously as far as that were possible. This has always been considered an important factor in Puerto de La Luz, since, given its nature as a "port of call", it was not desirable from the point of view of competitivity to interrupt work operations on Sundays or for local and national holidays in order for the port to be able to attract passing ships. Industrial agreements thus featured and regulated the possibility of night shifts, holiday shifts and overtime with the resulting impact which these had on labour costs. The working week guaranteed for the stevedore, the end of temporary contracts, paid holidays, pensions and health and welfare services for dockers and their families represented major steps forward in port workers' living and working conditions, with higher incomes that were in fact superior to the national average. Nevertheless, these improvements also had negative effects on the port community: the imposition of flexible time and versatility. To date these uncertainties has not yet been solved.

In order to be able to identify more precisely the dimension and chronology of the changes and also to obtain a useful tool for carrying out comparisons with other sectors or other ports, we have produced an indicator for productivity in cargo handling at the Port of Las Palmas (Graph IV). Given the fact that no complete or reliable statistics series have been published for the whole period in question, at either the local or national level, the analysis is rather partial.

On our part, we have attempted to produce a productivity indicator which is basically a simple expression of port work performance based on cargo handling and calculated in terms of tonnage handled per employee.

In Graph V we can observe that the discontinuous nature of the data available has obliged us to present the variable in terms of per cent points, but even so the results are immediately apparent: an increase in the port's manoevering capability, the technological improvements introduced and the practically continuous fall in the number of port workers have all contributed to increasing the ratio considerably. Thus, while between the years 1939 and 1948 each worker handled between 200 and 1,800 tons of cargo per year, by the year 1997 this figure had increased to as much as 42,280. Needless to say, we must bear in mind the differences in the ways in which goods are handled today in contrast to 70 years ago.

Graph V: Evolution of the tonnage handled ratio / Average number of employees Puerto de La Luz y de Las Palmas (1928-1998)



Source: Las Palmas Port Authority. OTP. Our own elaboration

Obviously, the results displayed are not independent, but rather demonstrate trends which are similar to others varying over the period of time. Because of the discontinuous nature of the data, we can only really carry out an effective analysis for the 1988-1998 period, where expected values are obtained: the annual average number of workers is positively correlated with the number of ships (0.88) and with overall traffic (0.11). Similarly, a correlation with the inversions carried out and the containerization index gives negative values (-0.20 and -0.38 respectively) as was to be expected.

3. THE EFFECTS OF TECHNOLOGICAL CHANGE ON WORK ORGANIZATION PRACTISE AND LABOUR RELATIONS

The changes which we have examined led to a profound restructuring of port activity, which in turn led to major changes in legislation (port reform), particularly in terms of labour relations.

As we have seen, loading and unloading work carried out in ports has traditionally been limited in terms of continuity by the demand for such services, which has led to the setting up of pools of workers (apart from the permanent staff provided by the stevedore companies) capable of covering demand as the need arises, at times when there is an increase in the number of ships

arriving at port. Such worker pools have in many cases diminished as a result of the technological evolution in stevadoring (Sundry and Turnbull, 1999), although this has not been the case in the Port of Las Palmas.

If we adopt a historical perspective, we could classify the Puerto de La Luz y de Las Palmas as a port which has been historically *unionized*. By this we mean that the unions, or pseudo-union organizations, enjoyed a monopoly with respect to the offer of manpower from the outset of worker collectivisation in the Port at the beginning of the XX century (Suarez Bosa, 1997ª). Powerful democratic unions were present in the Port prior to the Spanish Civil War, but with the arrival of the Franco regime they came to depend on the "Central Sindical Nacional" (CNC), even though in ports this vertically organised organ had an autonomous status.

In 1968 (decree dating from 13-5-68), and after three successive changes, the port's vertical syndicate was renamed the Organization of Port Workers (OTP). This organization was entrusted with the regulation and management of port workers and it was of a centralised, state-controlled structure, with delegations in every port, Las Palmas included. In principle, it was envisaged as a special employment list, but it gradually started taking on greater powers of intervention in port worker labour relations and assumed administrative functions, in accordance with the successive Decrees regulating the sector. From 1980 onwards it became known as the Special Employment Office, and continued as such until the 1986, the year in which the reform of the sector came into force via the creation of Loading and Unloading Companies.

We can therefore see that labour relations in Spain were impregnated by corporativism. This led to such a degree of inefficiency within the sector that reform was demanded by both employers and democratic workers' organizations alike, although these obviously had different conceptual viewpoints. The main problem facing the carrying out of this reform was that the workers' registers were being increasingly occupied by the relatives and offspring of the workers, who were thus automatically classed as unemployed. At the same time the authorities were ceding to both union and employer pressure to avoid conflict, since the costs of this unemployment were not borne by the sector but by the Social Security.

Technological modernization, the transfer of the employer functions of the State to the private sector and finally the competitiveness demanded by Spain's new position in the EC led stevadoring companies to opt for a complete structural overhaul of the sector in order to make it more viable. With the government's approval they aimed to do away with the OTP and create a

new framework for labour relations. With respect to maintenance, reform and dismantling, labour relationships between the government, employers and workers were turned upside down in Spain during the 1970's and 80's. To break this situation down, we could generalize by saying that the employers wanted privatization and the reform of the OTP; the workers did not want the OTP to disappear as a public service and they were fearful about the flexibility of their working conditions; the Government, on the other hand, was interested in reforming the sector and cleansing it of its residual corporativism, but was undecided about the desirability of complete privatization or maintaining the sector under state control. The final compromise reached was a semi-private company, with the State as main shareholder.

However, it was far from straightforward to bring about such a reform, and Puerto de La Luz, in common with other Spanish ports was the scene of serious industrial disputes in the 1980's. By this time, Canarian port workers had been able learn techniques of confrontation, such as imposing a go-slow, alternating strike days, alternate hourly striking, selective striking in a restricted number of companies, legal resource, the search for international solidarity which they were able to find in ports such as Rotterdam and Liverpool etc, and all of these techniques were used in Spanish ports during thus period. All of this confirms the general tendency of collectives which have a great power of pressure. Given the highly strategic nature of an activity such as loading/unloading, such collectives tend to organise along autonomous lines in local unions which converge into the State Coordinator of Port Stevedores, an organization which has representation in almost all of Spain's ports. The national unions were meanwhile in the minority. This led to a decentralised but radical voice of negotiation. From the mid 1980's, however, the *Coordinator* has modified its strategy and has opted instead for the defence of the "model Spanish port", with the emphasis on union aspects such as "unitarianism, rotation and training".

The strong union reaction to the reform projects led to a period of great instability in the port for an entire decade, and sparked off a series of strikes throughout Spanish ports, some of them violent. The industrial disputes were particularly severe in Puerto de La Luz, where major demonstrations took place, with the dockers not hesitating to bring the port to its knees in the defence of their interests, even if the majority of the strikes were in support of national stike action, namely to resist the dismantling of the OTP and in opposition to the effects of the port reform.

This process finally ended with a Royal Decree (1986) regulating the public service of ship loading/unloading which was finally accepted by all parties after some initial opposition. The text forms the foundation of today's labour relations in ports, together with Union Framework Agreements of 1981 and 1993. The OTP was now formally laid to rest and SESTIBA (State Loading and Unloading Companies) was created, with the Port Authorities taking a majority stake (49% for the shipping agents and 51% for the Port Authorities). This ruling promoted the internationalization of costing on the part of companies in the sector, as each of the Loading and Unloading Companies was established within each Port Authority with mixed capital. From that moment in time SESTIBA has been responsible, on a daily and rotatory basis, for the provision of manpower, who, together with the shipping agents' own staff, and under the same labour regime, carry out public service stevadoring operations. One of the most important concepts introduced by the new laws is that of versatility and functional mobility in ports in that pay-rolls were opened to temporary workers in a controlled fashion which does not seem to cause friction with the OIT recommendations for protecting workers' rights by guaranteeing work and a regular income.

4. CONCLUSIONS

From the analysis carried out we can conclude that the introduction of technology in the cargo handling process and the restructuring of transportation systems have led to a considerable reduction in the port workforce.

Similarly, our trend-based approach demonstrates the positive evolution of the indicators from both the Port of Las Palmas as well as other Spanish ports. It also shows the impact which technological innovations have had on the organization of work and labour relations within the Port. The large-scale introduction of containers from the 1960's onwards required new methods for organising port operations, leading to massive reductions in work team employment and changes in contractual relationships, factors which form the basis of the high performance achieved in recent years.

On the other hand, the use of new technologies has led to a reduction in the workforce, creating grave excess manpower problems in the 1970's and 80's. At present there are just 436 stevedores employed in the port, of whom 321 belong to SESTIBA. The introduction of new technologies also initially led to a drastic reduction of employees in the Puerto de La Luz y de

Las Palmas, very much in line with the trend observed all over the world. Nevertheless, employment figures have gradually started to grow once more, although will never again attain levels existant prior to the introduction of the new technologies. In spite of the unfortunate discontinuity of data, we have been able to show an almost continual decline in the average number of port employees and the exponential increase in the tonnage handled/average number of employees ratio, as a simple productivity measure. A further approximation, carried out for the last ten year period, displays negative degrees of dependence between the workers and the number of cranes in operation and the containerization index.

After the conflictive period of the Spanish Political Transition which started in the 1970's, in 1986 the ships loading and unloading public service was set up and this was finally accepted by all parties. This text forms the cornerstone of today's labour relation in ports, together with the Union Framework Agreements of 1981 and 1993. This certified the death of the OPT which was replaced by the State Loading and Unloading Companies (SESTIBA). The ruling led to the financial internationalization of companies in the sector, since the SESTIBA were established in each Port Authoruty using mixed capital: 49% for the shipping agents and 51% for State-owned Port Authorities. From this time onwards, the SESTIBA have been responsible for providing manpower on a daily and rotatory basis. These workers, together with the staff of the shipping brokers, who share the same labour regime, are responsible for carrying out public service stevadoring operations. However, the most significant new development is that the new laws allow temporary workers to be employed in a controlled way, with a view to provide the sector with greater versatility and functional mobility.

5. REFERENCES

Arenas Posadas, C., A. Florencio Puntas y J. I. Martínez Ruiz (1998): *Mercado y organización del trabajo en España (siglos XIX y XX).* Grupo Editorial Atril, Sevilla.

Babiano Mora, J. (1995): *Emigrantes, cronómetros y huelgas*. Siglo XXI, Madrid.

Broeze, F. (1991): "Maritime labour 1870-1914: an International perspective", International Review of social History, v. XXXVI-1, pp. 165-200.

------ (1998): "Containerization: the ultimate internationalization of liner shipping", en C. Eugenia Nuñez (Editor), Global markets: the internationalization of the sea transport industries since 1850. Proceedings Twelfth international Economic History Congress, Madrid.

Canalejos, I. (1995): "El sector portuario de estiba en España", en *Boletín Económico* ICE , nº 2460/61, pp. 75-80.

------ (1998): "La organización de la estiba en España", en Puertos del Estado, *I Congreso Internacional de estiba. Ponencia, T. I.* (mecanografiado), s/p.

Castillo Martín, J. F. (1998*): La Luz, 1883-1983. Evolución tecnológica y desarrollo portuario.* Real Sociedad de Amigos del País de Las Palmas, Las Palmas.

Coll Botella, L. y otros (1988*): Coordinadora estatal de estibadores portuarios. Historia de una década*. Gráficas Canigó, Barcelona.

Couper, A. D. (1987): *Nuevas técnicas de manipulación de la carga. Repercusiones sobre el empleo y las destrezas del trabajo en los puertos*. Ministerio de Trabajo y Seguridad Social, Madrid.

Davies, P. y Marriner, S. (1988): "Recent publications and development in the study of maritime economic history", *Journal Transport History*, V. 9, 1, pp. 93-1908.

Davis, S. (1997): "Employers and Dock Labour", pepers presentado en "Comparativa International History of Dock Labour, c. 1790-1970", Conference at the International Institute of Social History Amsterdam, the Netherlands, noviembre de 1997 (mecanografiado).

Delgado Aguiar, G. (1992): *Transporte y comunicaciones marítimas en Gran Canaria*. CIES de la Caja de Canarias, Las Palmas.

De Rus, G. Román, C. y Trujillo, L. (1994*): Actividad económica y estructura de costes del Puerto de La Luz y de Las Palmas*. Ed. Cívitas, Madrid.

Evans, N., Mackay, O., Garret, M.y Sutcliffe, P. (1993): *The abolition on the dock labour Scheme.* Research Series, nº 14, Employment Department, London.

García González, J. (1998): "La acción sindical en el marco español de relaciones Laborales en el sector de la estiba", en Puertos del Estado, *I Congreso Internacional de estiba. Ponencia*, T. II, (mecanografiado), s/p.

Hayuth, Y. y Hilling, D. (1992): "Technological change and sea port development", Hoyle, B. S. y Pinder, D. A, *European port cities in transition*, Behalven Press, London.

Ibarz Gelabert, J. (1998*): Historia general de la Coordinadora (1978-1998). La construcción de un espacio sindical portuario*. Coordinadora Estatal de Trabajadores del Mar, Barcelona.

Lavalette, M. y Kennedy, J. (1996*): Solidarity on the Waterfront. The Liverpool Lock Out of 1995/96*. Liver Press, Merseuside.

Miller, R. CH. (1969): "The dockworker Subculture and Some Problems in Cross-Cultural and Cross-Time Generalizations", en Comparative Studies in Society and History, Vol. 11, 1969.

Ministerio de Trabajo/OTP: OTP. *Organización de Trabajos Portuarios*. Servicio de publicaciones del Ministerio de Trabajo. Madrid. (Varios años)

Philips, G. and Whiteside, N. (1985): *Casual Labour. The unemployement question in the port transport industy 1880-1870*. Clarendon Press, Oxford.

Pintado, J. M. (2000): "El Puerto de la Luz, amenazado (I)", en *La Provincia*, 20 de junio de 2000, p.55.

Rodríguez Ramos, T. (1997*): La relación laboral especial de los estibadores portuarios*. Editorial Trota, Madrid.

Saundry, R. S. and Turnbull, P. (1999): "Contractual (In)Security, Labour Regulation and Competitive performance in the Port Transport Industry: A Contextualized Comparison of Britain and Spain", British Journal of Industrial Relations, v. 37, nº 2, pp. 271-294.

Suárez Bosa, M. (1995): *Economía, sociedad y Relaciones Laborales en Canarias en el período de entreguerras*. Universidad de Las Palmas/Consejería de Empleo y Asuntos Sociales del Gobierno de Canarias, Las Palmas.

------ (1997a): "La organización del trabajo portuario: el caso de La Luz y de Las Palmas (1891-1980)", en C. Arenas Posadas, Antonio Florencio Puntas y José Ignacio Martínez Ruiz (eds*), Mercado y organización del trabajo en España (Siglos XIX y XX)*, pp. 301-317.

------ (1987b). "Empresas consignatarias y estibadoras en el Puerto de La Luz y de Las Palmas: Estrategia y organización", *Actas del VI congreso de la Asociación de Historia Económica*, Girona, 15-17 de septiembre de 1997, pp. 255-268.

Trujillo, L. y Nombela, G. (1999): "El sector portuario español: organización actual y perspectivas", *Papeles de Economía Española*, nº 82, pp. 71-85.

Turnbull, P., Woolfson, CH. y Kelly, J. (1992*): Dock Strike: Conflict and Restucturins in Britain's Ports.* Avebury, Aldershot, Hants, England.

Turnbull, P. and Wass, V (1994): "The Greatest Game no More-Redundant Dockers and the Demise of "Dock Work"", *Work, Employement & Society,* 8 (4), 487-506.

Williams, D. M. (1993): "The Progress of Maritime History, 1953-1993", *Journal of Transport History,* XIX, pp. 126-141.

TABLE II: Matrix of correlations [3]
Puerto de La Luz y de Las Palmas (1988-1998)

	Total goods	Investments	Containerization Index	Average annual workers	Nº of cranes
Total cargo	1				
Investment	0,78	1			
Containerization index	0,79	0,74	1		
Average annual wo rkers	-0,50	-0,59	-0,71	1	
Nº of cranes	0,55	0,75	0,58	-0,31	1

Source: Las Palmas Port Authority. OTP. Puertos del Estado records. Sestiba. Our own elaboration.

[3] We emphasise the desirability of comparing the matrix between other periods of time, but the discontinuous nature of the data which we have already mentioned and the difficulties involved in obtaining such data have meant that such a comparative analysis is impossible

Table III: Evolution of port indicators
Puerto de Las Palmas (1920-1950)

Year	Average load per vessel (total vessels)		Average size of vessel (total vessels)	
	Real data	Annual variation rate	Real data	Annual variation rate
1920	N.D.	N.D.	2038,97	-
1921	N.D.	N.D.	3657,98	79,40
1922	N.D.	N.D.	3696,24	1,05
1923	N.D.	N.D.	3918,02	6,00
1924	N.D.	N.D.	3882,99	-0,89
1925	N.D.	N.D.	2763,38	-28,83
1926	N.D.	N.D.	3987,24	44,29
1927	N.D.	N.D.	3683,83	-7,61
1928	225,33	-	2066,27	-43,91
1929	171,11	-24,06	1515,95	-26,63
1930	168,62	-1,46	2737,07	80,55
1931	191,72	13,70	1597,07	-41,65
1932	222,57	16,09	1636,67	2,48
1933	227,40	2,17	1615,76	-1,28
1934	199,21	-12,40	1539,18	-4,74
1935	204,76	2,79	3078,13	99,98
1936	198,27	-3,17	1580,84	-48,64
1937	239,44	20,76	1570,66	-0,64
1938	229,70	-4,07	1528,03	-2,71
1939	239,89	4,43	1423,51	-6,84
1940	193,36	-19,39	1558,07	9,45
1941	116,95	-39,52	468,31	-69,94
1942	119,80	2,44	487,47	4,09
1943	122,73	2,44	487,95	0,10
1944	128,03	4,32	449,96	-7,78
1945	121,07	-5,44	888,04	97,36
1946	184,68	52,53	993,24	11,85
1947	274,50	48,64	1321,95	33,09
1948	274,41	-0,03	1489,53	12,68
1949	291,44	6,21	2748,60	84,53
1950	285,87	-1,91	2836,87	3,21

TABLE III (continuation): Evolution of port indicators Puerto de La Luz y de Las Palmas (1951-1998)

Year	Average load per vessel (total vessels)		Average size of vessel (total vessels)	
	Real data	Annual variation rate	Real data	Annual variation rate
1951	303,16	6,05	2834,67	-0,08
1952	276,87	-8,67	2851,96	0,61
1953	280,09	1,17	3009,68	5,53
1954	300,83	7,40	3062,13	1,74
1955	331,11	10,07	3086,41	0,79
1956	335,99	1,47	3584,37	16,13
1957	103,85	-69,09	4230,77	18,03
1958	430,27	314,33	3284,92	-22,36
1959	470,41	9,33	3399,18	3,48
1960	384,50	-18,26	2829,74	-16,75
1961	400,60	4,19	2593,66	-8,34
1962	266,37	-33,51	2518,32	-2,90
1963	300,91	12,97	2503,10	-0,60
1964	315,83	4,96	2511,98	0,35
1965	284,62	-9,88	2571,74	2,38
1966	304,70	7,05	2554,72	-0,66
1967	301,67	-0,99	3476,54	36,08
1968	301,77	0,03	3661,57	5,32
1969	308,10	2,10	3813,05	4,14
1970	320,30	3,96	4016,65	5,34
1971	272,27	-14,99	3425,40	-14,72
1972	304,69	11,91	3507,90	2,41
1973	287,72	-5,57	3530,37	0,64
1974	257,86	-10,38	3291,60	-6,76
1975	233,13	-9,59	2948,82	-10,41
1976	234,30	0,50	2952,28	0,12
1977	258,77	10,45	3125,70	5,87
1978	278,60	7,66	3125,15	-0,02
1979	278,72	0,04	3344,58	7,02
1980	295,70	6,09	3460,48	3,47
1981	307,72	4,07	3728,28	7,74
1982	313,43	1,86	3535,00	-5,18
1983	371,10	18,40	3427,01	-3,05
1984	371,62	0,14	3339,67	-2,55
1985	441,15	18,71	3473,25	4,00
1986	454,50	3,02	3172,54	-8,66
1987	452,02	-0,55	3032,51	-4,41
1988	472,26	4,48	3175,09	4,70
1989	477,35	1,08	3233,96	1,85
1990	450,26	-5,67	3208,89	-0,78
1991	515,25	14,44	3485,90	8,63
1992	606,54	17,72	3289,90	-5,62
1993	634,61	4,63	3264,16	-0,78
1994	710,02	11,88	3290,66	0,81
1995	734,99	3,52	4050,52	23,09
1996	678,05	-7,75	4263,23	5,25
1997	737,06	8,70	4952,66	16,17
1998	833,65	13,10	5847,79	18,07

Source: Las Palmas Port Authority. Our own elaboration.